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REFLEXIONS *on* METEOREOLOGICAL TABLES.

By RICHARD KIRWAN, *Esq; F.R.S. and M.R.I.A.*

IN my former paper on this subject I endeavoured to shew one important purpose to which the observations of a number of years already made by Doctor Rutty might be applied, but found myself not a little embarrassed by the undefined use of the terms *wet* and *dry*, so frequently applied to the periods observed. To remove this embarrassment I measured the quantity of rain, and observed its duration during some of the periods that are decidedly deemed *wet*, both here and in England, and have thereby been enabled to fix in some measure the sense of these terms; for I have observed that calling the *day* that space of time during which men are usually occupied in the open air, viz. from six o'clock in the morning to six in the evening, we account a day *wet* if it rains above half that period, that is seven hours, and if the quantity of rain that

Read July
23, 1793.

that falls during that time is nearly one pound troy (or more) on the space of one square foot; which quantity would rise in a hollow cube of that dimension to the height of 0.157639. It is by this last method that the quantity of rain is usually indicated in meteorological tables, without any regard however to its duration.

If the quantity of rain that falls in seven hours be only about half a pound, it is called only a *mizzle*. If it considerably exceeds one pound, and lasts eight, nine or ten hours, the day is called exceeding wet; on such days I have known it to rain five or six pounds. On the contrary, if it rains one pound in two hours, particularly in the morning, and all the rest of the day is fine, we shall scarce call it wet, but at most a *variable* day.

HENCE the wetness or dryness of any other period is generally in a compound ratio of its quantity and duration. A *week* is counted wet when it contains four wet days or more, a *month* when it contains three wet weeks, and a *season* or period of three months when it contains two wet months. With respect to a *year*, these denominations are applied somewhat differently; here regard is chiefly had only to the operations of agriculture, which chiefly take place in Spring, Summer and Harvest seasons. If the two last seasons be so wet as to impede the husbandman in any considerable degree the year will universally be denominated wet, though the quantity of rain be on the whole much smaller than in other years.

THE

THE quantity of rain falling in one day, sufficient to have that day denominated wet, I have said to be about one pound troy. It is evident, however, that this cannot be settled with such mathematical precision that even $\frac{3}{4}$ of that quantity may not be sufficient. And hence a *month* may be denominated *wet* during seventeen or eighteen days, of which only 12 lb. of rain or 1.891668 inches have fallen, which is about $\frac{3}{4}$ of a lb. per day, particularly in the summer and autumnal seasons; variable if ten, and dry if only eight.

IN denominating the Spring season *wet* or *dry*, I now proceed to shew that Doctor Rutty, in using the words *wet* and *dry*, has applied them conformably to the above determinations. In order to which nothing more will be necessary than to prove that he has applied them to the same modifications of the weather and the same measures of each as Mr. Barker of Lyndon, whom I may stile a cotemporary reporter for a great part of the time, and a more assiduous and meritorious England has not yet produced.

MR. Barker then in the Philosophical Transactions for the year 1770 has given an account of the monthly quantity of rain that fell at Lyndon in Rutland from the year 1737 to the year 1770 inclusively. He observes that in common speaking those are called *wet* years in which the Summer, the growing season, was wet and cold, and those dry ones in which the Summer was dry and burning. He then tells us that the years 1737, 40, 41, 50, 60, 62 and 65 were complained of as dry,

and the years 1738, 39, 51, 52, 56, 63 and 66 were wet. Now on inspecting the table which I have extracted from Doctor Rutty's observations, it will be found that the Summers of each of those are marked *dry*, except the year 1750, which was certainly different from that of Lyndon, and 1760, which he denotes variable. As to the *wet* years they both perfectly agree. A standard conformable to their ideas may be deduced from my own observations of that frequency and quantity of rain which must constitute a wet or dry period; its conformity with Mr. Barker's determinations may be seen in the following tables:

TABLE THE FIRST.

Of the Quantity of Rain in dry Summers.

	1737.	1741.	1750.	1760.	1762.	1765.	1771.
June - -	.720	1.366	2.069	2.470	.764	.788	1.588
July - -	.306	.873	1.510	.895	1.119	.582	1.043
August -	6.300	1.633	.640	1.644	3.615	2.805	2.131
	7.326	4.219	4.219	5.009	5.498	4.175	4.762

ON

ON this table we may remark, first, that when the quantity of rain during the Summer months does not amount to 5.044 inches, or 32 lb. troy, which is at the rate of 10,33 lb. per month, or 1,628 inches, the Summer is counted *dry*. To this, however, it may be objected, first, that the Summer of 1737 was accounted *dry*, though the quantity of rain amounted to above seven inches, but it must be observed that above six of them fell in August, and the two preceding months were most remarkably dry; secondly, it may be said that the Summer of 1762 was deemed *dry* though there fell 5.498 inches; but in this case also June and July were remarkably dry; besides much of the rain might have fallen in a few days, and not have been sufficiently dispersed and divided through each month, the frequency of rain not being noticed in the tables. All this being duly considered, it must be allowed that these results are strictly conformable to my determinations. I have omitted the year 1740 because that year could not possibly be counted *dry* at Lyndon from the small quantity of rain that fell in Summer, it having rained more in each of the Summer months that year than in 1739, whose Summer was accounted *wet*; but it evidently acquired that denomination from the exceeding scarcity of rain in all other months.

TABLE THE SECOND.

Of the Quantity of Rain in wet Summers.

	1739.	1751.	1752.	1756.	1763.	1766.	1767.
June -	1.537	1.847	3.084	2.973	2.426	2.279	2.163
July - -	1.965	4.989	3.678	3.197	5.657	2.363	3.682
August -	2.350	1.580	1.334	4.257	2.929	.409	1.527
	5.852	8.416	8.096	10.427	11.012	5.051	7.372

THESE results shew us that a Summer is reckoned *wet* when it rains 1,8916 inches, or 12 lb. a month or more for any two months. But in general in wet Summers there falls about five inches, that is, above 36 lb. in three months.

HENCE the *variable* Summers are those in which there falls between 24 lb. and 28 lb. in two months, or between 30 lb. or 36 lb. in three months. Perhaps also those Summers are called *variable* in which larger quantities of rain fall than those here mentioned, if they fall at distant intervals, as from twelve to fourteen or sixteen days. But the former interpretation being more conformable to the table, seems to me most probable.

IN Spring the two last months, April and May, are chiefly regarded; the terms *wet*, *dry* and *variable* are applied to them to the same extent as to the Summer months.

IN

IN Autumn, on the contrary, the state of the two first months is most important. If 11 lb. or 12 lb. of rain be distributed through sixteen or eighteen days of each of these months it will be accounted *wet*; but if only 8 lb. or 10 lb. it will be deemed *variable*, and if still less *dry*.

TABLE THE THIRD.

Of the Correspondence of the Weights and Measures of Rain.

Inches.		Inches.		Inches.	
$\frac{1}{4}$ lb. troy =	.039409	22 lb. troy =	3.468058	46 lb. troy =	7.2512
$\frac{1}{2}$ - -	.078819	23 - -	3.625697	47 - -	7.4088
$\frac{3}{4}$ - -	.118228	24 - -	3.783336	48 - -	7.5666
1 - -	.157639	25 - -	3.940975	49 - -	7.7242
2 - -	.315278	26 - -	4.098614	50 - -	7.8818
3 - -	.472917	27 - -	4.256255	51 - -	8.0394
4 - -	.630556	28 - -	4.413892	52 - -	8.1972
5 - -	.788195	29 - -	4.571531	53 - -	8.3548
6 - -	.945834	30 - -	4.7291	54 - -	8.5124
7 - -	1.103473	31 - -	4.8868	55 - -	8.6700
8 - -	1.261112	32 - -	5.0444	56 - -	8.8276
9 - -	1.418751	33 - -	5.2020	57 - -	8.9852
10 - -	1.57639	34 - -	5.3596	58 - -	9.1430
11 - -	1.734029	35 - -	5.5172	59 - -	9.3006
12 - -	1.8911668	36 - -	5.6750	60 - -	9.4582
13 - -	2.049307	37 - -	5.8326	<hr/> 70 - - 11.0347 80 - - 12.6051 90 - - 14.1875 100 - - 15.7639 <hr/> $\frac{1}{3}$ of a lb. = .0524944 $\frac{2}{3}$ - - .10498824 1 oz. - .01313	
14 - -	2.206946	38 - -	5.9902		
15 - -	2.364585	39 - -	6.1478		
16 - -	2.522224	40 - -	6.3054		
17 - -	2.679863	41 - -	6.4635	<hr/> $\frac{1}{3}$ of a lb. = .0524944 $\frac{2}{3}$ - - .10498824 1 oz. - .01313	
18 - -	2.837502	42 - -	6.6208		
19 - -	2.995141	43 - -	6.7784		
20 - -	3.15078	44 - -	6.9360		
21 - -	3.310419	45 - -	7.0936		

SPRING

SPRING contains fixty-one days.

	It rains	Inches
If wet	36 days or more	3.783 or more.
variable	30 - -	3.150 or one month dry and one wet.
dry	24 or lefs - -	2.522 or lefs.

SUMMER contains ninety-two days.

wet	54 or more - -	5.67 or more, or two wet months.
variable	45 - -	4.729
dry	36 or lefs - -	3.783 or two dry months.

AUTUMN contains fixty-one days.

wet	36 or more - -	3.783
variable	30 - -	3.150
dry	24 or lefs - -	2.522 or lefs.